

Appl. No. 10/628,899
Examiner: VU, DAVID, Art Unit 2818
In response to the Office Action dated March 21, 2005

Date: June 21, 2005
Attorney Docket No. 10112531

REMARKS

Applicant thanks the Examiner for acknowledging Applicant's claim to foreign priority and receipt of the certified copy of the priority document. Responsive to the Office Action mailed on March 21, 2005 in the above-referenced application, Applicant respectfully requests amendment of the above-identified application in the manner identified above and that the patent be granted in view of the arguments presented. No new matter has been added by this amendment.

Present Status of Application

Claims 1, 4, 5, 7 and 10-12 stand rejected under 35 U.S.C 102(e) as being anticipated by Forster et al (US 6,455,369). Claims 2, 3, 13, 14, 18, 20, 23 and 24 stand rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al view of Childambarrao et al. (US 6,707,095). Claim 8 stands rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al view of Bronner et al (US 6,177,696). Claims 6 and 9 stand rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al in view of Schrems (US 6,580,110). Claim 21 stands rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al in view of Childambarrao et al and in further view of Bronner et al. Claims 16 and 22 stand rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al view of Childambarrao et al and in further view of Schrems. Claims 15 and 17 stand rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al view of Childambarrao et al and in further view of Mandelman et al (US 6,437,401). The drawings are objected to for informalities.

In this paper, claim 1 is amended to incorporate the limitations of claim 6. Claim 13 is amended to incorporate the limitations of claims 19. Claims 6 and 19 are canceled. The drawings and specification are amended to overcome the objections as described in further detail below. Thus, upon entry of this amendment, claims 1-5, 7-18, and 20-24 are pending.

Reconsideration of this application is respectfully requested in light of the amendments and the remarks contained below.

Drawings

The drawings are objected to under 37 CFR 1.84(p)(5) for showing reference numbers 112" (in Fig. 1h) and 118" (Fig. 1e) not disclosed in the specification. In the attached replacement drawings, reference number 118" shown in Fig. 1e is amended to 108" to correct a typographical error in the original drawings. The specification is amended to disclose reference number 112". Namely, at page 8, line 26 of the specification, the sentence "[t]hereafter, the collar insulating layer 112' over the conductive layer 120 is removed, leaving a portion of the collar insulating layer 112'" is inserted. Support for these amendments can be found at various portions of the application. By way of example, Figs. 1g to 1h show that the collar insulating layer 112' is partially removed, leaving a portion of the collar insulating layer 112". Accordingly, no new matter has been added and the Applicant submits that the drawing objections have been overcome.

Deficiency of the Office Action

The rejection of claim 19 is insufficient, insofar as it does not comply with the requirements of MPEP 707.07 *et seq.*, which requires that all rejections be stated with completeness and clarity. MPEP 707.07(d) requires that the grounds of a rejection be "fully and clearly stated." The office action fails to meet this requirement in the present application in connection with claim 19. Namely, Applicant could find no stated grounds for the rejection of claim 19 in the office action.

In this paper, claim 13 has been amended to include all the limitations of original claim 19. As the office action fails to state with completeness and clarity any teaching or suggestion any grounds for the rejection of claim 13/19, Applicant submits that the rejection of claim 13 should be withdrawn. Should an ensuing office action be mailed which provides grounds for the rejection of claims 13, such an ensuing office action should be made non-final.

Rejection of Claim 1

Claim 1 is amended to recite the limitations of original claim 6. Original claim 6 was rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al in view of Schrems. To the extent that the grounds of the rejections may be applied to the claims now pending in this application, they are respectfully traversed.

Forster et al disclose a method for fabricating a trench capacitor, in which a polysilicon layer S5 and remaining arsenic glass S4 are successively removed after forming the collar oxide layer S31. See col. 12, lines 15-19 and Fig. 3H of Forster et al.

Schrems discloses a trench capacitor. In order to form the buried plate 165, vapor phase doping is carrier out. It is also possible to effect doping from an ASG or PSG layer in the trench. See col. 11, lines 45-50 and Fig. 8 of Schrems. Moreover, the lower region of the insulation collar layer is removed by wet-chemical (e.g. BHF) or a dry-chemical etching method. See col. 12, lines 30-35 and Fig. 9B.

Whether taken alone or in combination, Forster et al and Schrems fail to teach or suggest a method for fabricating a bottle-shaped trench capacitor comprising the steps of successively removing the first conductive layer and the doped layer using the collar insulating layer as a mask to expose the surface of the doping region, wherein the doped layer is removed by vapor hydrofluoric acid, as recited in claim 1.

MPEP 2142 reads in part:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In connection with the third criteria, MPEP 2143.03 goes on the state:

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of

that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

The Office Action indicates that Forster et al fail to teach or disclose "the wet chemical is BHF or NH_4OH and dry chemical such as HF," but that the reference can be combined with Schrems, which teaches BHF is used for etching the insulation material (nitride layer) and NH_4OH or HF is used for widening the lower region of the trench. Applicant respectfully disagrees.

Schrems does not teach or disclose how to remove a doped layer. In particular, it is noted that Schrems teaches the *insulation collar layer* is removed by BHF or dry etching. This is different that the removal of a doped layer which is used for formation a doped region in the substrate in claim 1.

As set forth above, the Examiner has acknowledged that Forster et al does not teach or reasonably suggest at least certain limitations described above in claim 1. Since Schrems also fails to teach or reasonably suggest said limitations, Applicant respectfully submits that even when combined, Forster et al and Schrems fail to teach all the limitations of claim 1. For at least this reason, Applicant requests that the rejection of claim 1 be withdrawn and that claim 1 be passed to issue. Since claims 2-5 and 7-12 are dependent claims that incorporate the limitations of claim 1, Applicant respectfully requests that these claims also be allowed

Claim 13

Claim 13 has been amended to recite the limitations of original claim 19. As noted above, Applicant could find no specific grounds for the rejection of claim 19 in the office action. However, it appears that the Examiner may have intended to rejection claim 19 over Forster et al view of Childambarrao et al and in further view of Schrems. See section 8 of the office action. To the extent that the grounds of the rejections may be applied to the claims now pending in this application, they are respectfully traversed.

Whether taken alone or in combination, Forster et al, Childambarrao et al, and Schrems fail to teach or suggest a method for fabricating a bottle-shaped trench capacitor comprising the steps o successively removing the polysilicon layer and the doped silicon oxide layer using the collar

insulating layer as a mask to expose the surface of the doping region, wherein the doped silicon oxide layer is removed by vapor hydrofluoric acid, as recited in claim 13.

As noted in connection with claim 1, neither Forster et al nor Schrems teach the above-identified step.

Childambarrao et al disclose a method for forming a vertical transistor memory cell structure. See the abstract. A plurality of deep trench capacitors C are formed in the lower portions of plurality the DT's 13. The capacitors C share an N+ doped buried plate 12, which serves at the outer electrode of the capacitors C. See col. 12, lines 8-12 and Figs. 7B-7C of Childambarrao et al. It is noted that nowhere in Childambarrao et al is it taught or suggested that a doped silicon oxide layer is removed by vapor hydrofluoric acid.

Applicant therefore respectfully submits that even when combined, Forster et al, Childambarrao et al, and Schrems fail to teach all the limitations of claim 13. For at least this reason, Applicant requests that the rejection of claim 13 be withdrawn and that claim 13 be passed to issue. Since claims 14-18 and 20-24 are dependent claims that incorporate the limitations of claim 13, Applicant respectfully requests that these claims also be allowed.

Other Rejections Under 103(a)

Claim 8 stands rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al view of Bronner et al. Claim 21 stands rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al in view of Childambarrao et al and in further view of Bronner et al. Claims 15 and 17 stand rejected under 35 U.S.C 103(a) as being unpatentable over Forster et al view of Childambarrao et al and in further view of Mandelman et al.

As noted above, it is Applicant's belief that that claims 2-5, 7-12 and 14-18, 20-24 are allowable by virtue of their dependency from claims 1 and 13, respectively. For this reason, the Examiner's arguments in connection with the above-identified claims are considered moot and will not be addressed here.


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Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

Respectfully submitted,



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AMENDMENTS TO THE DRAWINGS

The attached one (1) sheet of drawings replaces the original sheet for Figures 1e and 1f and includes changes to Fig. 1e.

Attachment: Replacement Sheets (1)